

Industrial Waste Treatment, Volume I

While much of the information in the Class B, C, & D study guides is the same, the higher licensing exams will contain more specific and difficult questions.

Discuss water use and treatment by industrial in general.

Describe the character of wastewater and types of wastewater treatment used by different industries.

List and discuss types of wastewater treatment plant hazards.

Discuss safety procedures that an operator should observe when working in various areas and on various types of equipment in a wastewater treatment plant.

Describe collection system hazards.

Discuss laboratory safety.

Describe lockout/tagout procedures in detail.

Discuss the development and implementation of a safety training program.

Discuss enforcement and penalties for non-compliance with environmental laws.

Discuss pollution prevention.

What are the effects of industrial wastestreams?

Describe specific types of treatment and problems associated with different manufacturing processes.

Describe the basic concepts of flow measurement.

Discuss open channel flow measurement.

Discuss closed pipe flow measurement.

How are flowmeters calibrated?

What types of flows should be measured? Discuss.

How does coagulation / flocculation work?

Describe jar testing.

What chemicals are used to improve settling?

Describe the types of equipment used in physical-chemical treatment processes.

What are typical operation, start-up and maintenance procedures for physical-chemical treatment processes.

Explain how to flow proportion composite samples.

Discuss the operation and maintenance of gravity filters in detail.

Discuss inert-media pressure filters.

Discuss continuous backwash, upflow, and deep-bed silica sand media filters.

Discuss the types, operation and maintenance of cross flow membrane filtration in detail.

Discuss the air stripping of volatile organics.

Describe the troubleshooting and maintenance of an air stripping system.

Describe the activated carbon adsorption process.

Discuss activated carbon regeneration.

Describe the troubleshooting and maintenance of an air stripping system.

Compare and contrast types of metal wastestreams.

Describe several methods used to dewater sludges.

Describe several sludge drying methods.

Industrial Waste Treatment, Volume II

While much of the information in the Class B, C, & D study guides is the same, the higher licensing exams will contain more specific and difficult questions.

Discuss the various types of industrial treatment facilities (e.g. - dairy, petroleum, metal finishing, etc.) and key aspects of those treatment processes.

Compare and contrast the various fixed growth (or fixed film) processes such as trickling filter, biotower, etc.

Describe the function and maintenance of the primary equipment used in the various fixed growth processes.

Troubleshoot common problems associated with fixed growth processes.

Discuss filter media in detail.

Compare and contrast the various aeration systems used in the activated sludge process.

RAS (Return Activated Sludge) - methods and process control in detail.

WAS (Waste Activated Sludge) - methods and process control in detail.

Discuss the following terms:

- F/M (Food/Microorganism Ratio)
- MCRT (Mean Cell Residence Time)
- MLVSS (Mixed Liquor Volatile Suspended Solids)
- OUR (Oxygen Uptake Rate)

Discuss activated sludge microbiology:

- the types of organisms
- what the organisms generally indicate in relation to sludge quality
- troubleshooting the activated sludge process using microbiology

Discuss Sequencing Batch Reactors (SBRs): start-up, process control, equipment, operation and maintenance, troubleshooting, etc.

Describe the following aspects of anaerobic treatment in detail:

- the anaerobic digestion process
- compare and contrast types of anaerobic reactors and treatment systems

- start-up and normal operating procedures
- troubleshooting
- laboratory tests and procedures
- safety and maintenance

Compare and contrast the following types of sludge thickening in detail:

- gravity thickening
- dissolved air flotation
- centrifuge
- gravity belt filter

Discuss methods of sludge stabilization and conditioning.

Describe methods of sludge dewatering in detail.

Describe solids disposal options and government regulation

What should a wastewater treatment plant maintenance program / safety plan include?

Study proper maintenance start-up procedures and troubleshooting guides for maintenance equipment.

Compare and contrast the various types of pumps, their preventative maintenance and troubleshooting.

Discuss electrical equipment safety and maintenance.

Discuss motor safety, maintenance and troubleshooting.

Discuss flow meters: types, sensor maintenance, calibration, troubleshooting, etc.

Pretreatment

Describe the objectives of the National Pretreatment Program and its origin.

Define a Significant Industrial User (SIU).

When are Control Authorities required to inspect SIUs.

A POTW's requirement to develop and implement a pretreatment program is a condition of what?

Laboratory, Sampling & Monitoring

Describe chemical names and chemical formulas.

Describe laboratory equipment.

Discuss the term "solutions".

What is the term "titration"?

Discuss the use of a spectrophotometer.

Discuss the corrosive chemicals found in laboratories.

Describe the toxic chemicals found in a laboratory.

Discuss proper laboratory techniques.

Discuss the importance of sampling.

Describe the types of samples collected at a wastewater treatment plant.

Describe the proper preservation of samples.

Describe the tests for settleable solids.

Describe the suspended solids test.

How do you determine volatile solids.

Discuss the measurement of the sludge volume index.

Discuss the measurement of D.O. in the aeration tanks.

Describe the alkalinity test procedure.

Describe the COD test procedure.

Describe the term "buffer".

Describe the D.O. tests.

Describe the BOD tests.

Describe the pH tests.

Discuss the measurement of metals in wastewater.

What does the term “TKN” stand for? What does it measure?

Discuss the need for analyzing and presenting data.

Describe the causes of variation in laboratory test results.

Discuss the term “sampling”.

Describe the terms “manometer” and “gage reading”.

Discuss the importance of records.

Discuss annual reports.

Math Questions

Given a wastewater flow rate and the concentration of a pollutant, calculate the mass emission rate of the pollutant in lbs/day.

Given a mean flow rate and its standard deviation, calculate the coefficient of variation in %.

Given a cumulative flow volume and the lapse time, calculate the average flow rate in gph.

Given a flow rate and a chemical dosage, calculate the chemical application rate in lbs/day.

Given the volume of a clarifier and a flow rate, calculate its detention time in hrs.

Given the area of a membrane filter and a permeate flow rate in an ultrafiltration system, calculate the flux in gpd/sf.

Given a raw wastewater flow rate, a recirculation rate of the recycle water, and the surface area of a filter in a trickling filter system, calculate the hydraulic loading rate in gpm/sf.

Given a calculated waste activated sludge (WAS) flow rate, and the actual duration of WAS

pumping, calculate the new (actual) WAS flow rate in MGD.

Given lbs. of BOD removed and a yield factor in an activated sludge system, calculate the amount of sludge produced in lbs/day.

Given the concentration of BOD, nitrogen (N), and phosphorus (P), calculate the ratio of BOD: N: P.

Given an average flow rate, influent suspended solids (SS) concentration, and effluent SS concentration of a primary clarifier, calculate the daily production of primary sludge in lbs/day.

Given a dry weight of the daily production of sludge and the concentration of sludge, calculate the volume of sludge produced in gal/day.

Given an inflow rate in gpm and the area of liquid surface in a dissolved air flotation system, calculate the hydraulic loading in gpd/sf.

Given a sludge flow rate and a sludge concentration of the inflow to a basket centrifuge, calculate the solids loading in lbs/hr.

Given the influent and effluent SS concentration of a scroll centrifuge, calculate the solids removal efficiency in %.

Given a desired volume and concentration of a polymer solution for sludge conditioning, calculate the lbs of dry polymer required.

Given a recommended average annual pollutant loading (APL) of a metal in mg/kg, convert it to lbs/ton.